

RECEIVED
CENTRAL FAX CENTER

OCT 23 2006

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

REMARKS

Applicants wish to thank Examiner McDonald for the courtesy of his time, comments, and suggestions during the lengthy phone interview on 7/20/06.

Claims 1-36 are pending in this application. Claims 1-36 have been rejected.

Claims 1, 8, and 19 are currently amended as suggested by the Examiner.

Rejection under 35 USC 102(b)

The Examiner has rejected Claims 1-7 and 19-25 under 35 U.S.C. 102(b) as being anticipated by "Theoretical overview of the large-area plasma processing system (LAPPS)" by Manheimer et al. (Manheimer).

The Examiner states that Manheimer discloses a LAPPS system comprising a sheet electron beam, gas for a plasma, formed plasma, and substrate. The Examiner states that the surface of the substrate is altered by the radical and ion flux and are controlled based upon the desired pretreatment.

Applicants respectfully submit the following traversal of this rejection. As Applicants have previously submitted, Manheimer is a theoretical discussion of a basic LAPPS system in general. Manheimer does not teach or suggest the current large area metallization pretreatment and surface activation system. Manheimer does not teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate.

Applicants respectfully submit that the title of Manheimer is explicit and definitive in this regard as the discussion is entitled "*Theoretical* overview of the large-area plasma processing system (LAPPS)" (emphasis added). The discussion outlines the scientific and mathematical explanations for a LAPPS system, but does not teach or suggest the current large area

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

metallization pretreatment and surface activation system nor does Manheimer teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate. Applicants respectfully submit that mathematical formulas, laws of nature, and purely theoretical phenomena have long been considered unpatentable.

Furthermore, Applicants respectfully submit that the current large area metallization pretreatment and surface activation system removes the critical limitations set forth in and required by the Manheimer theoretical discussion. Manheimer specifically states that there in fact exist size limitations for the plasma and electron beam.

Still furthermore, Manheimer repeatedly, and throughout the theoretical discussion, states the *requirement* of a magnetic field. The current invention does not require a magnetic field, although in some embodiments a magnetic field may be utilized.

In Manheimer, there are multiple references throughout to the *requirement* of a magnetic field. Some of these references include, but are not limited to, the Abstract (line 5), the Introduction (line 15 of the first column and line 18 of the second column and multiple references in the final paragraph of the Abstract). The first sentence of the second section (2. Beam propagation and plasma production) reads, in part, "*discuss* the production and maintenance of a plasma by a *magnetized* electron beam". (emphasis added) More references include the first full paragraph of page 372 as published "a longitudinal magnetic field *B* is applied" and the next paragraph includes "the magnetic field can be tapered." As mentioned, these references are listed throughout and include a specific reference in the Summary section when the authors state there is a "need for a magnetic field".

The present application specifically mentions that a magnetic field is *not* required. For example, on page 13 or paragraph 0022 as filed, the application states that the electron beam can

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

be produced "without the beam-collimating magnetic field". Additionally, Figure 4 illustrates a schematic without a magnetic field.

As such, Applicants respectfully submit that the current invention was not discussed in any printed publication.

Claims 1, 8, and 19 have been amended to use the phrase "consisting of". Applicants would like to thank the Examiner for taking the time to discuss this amendment and for suggesting that this amendment does exclude the use of a magnetic field and therefore overcomes Manheimer.

Claims 1, 8 and 19 do not contain the limitation of the magnetic field and as such the claimed invention is new, separate, and distinct over the prior art reference.

Therefore, Applicants respectfully submit that the 102(b) rejection has been successfully traversed and that claims 1, 8 and 19 are in condition for allowance. As claims 2-7 and 9-18 and 20-36 depend from an allowable claim, Applicants respectfully submit that these claims are also in condition for allowance. Applicants respectfully request reconsideration as to, and removal of, the 102(b) rejection.

Rejection under 35 USC 103

The Examiner has rejected Claims 8-14, 16-18, 26-32, and 34-36 under 35 U.S.C. 103(a) as being unpatentable over "Theoretical overview of the large-area plasma processing system (LAPPS)" by Manheimer et al. (Manheimer) in view of US 5,089,066 to Hamada et al. (Hamada).

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

The Examiner states that Manheimer indicates that a pretreatment is to be used before conventional plasma processing but does not disclose depositing a layer onto the pretreated substrate. The Examiner also states that Hamada discloses various deposition techniques that can be used after a substrate is pretreated. The Examiner concludes that it would have been obvious to "modify the *invention* of Manheimer" to utilize sputtering of CVD. (emphasis added)

As previously submitted, Applicants respectfully submit that Manheimer does not teach an invention. Rather, Manheimer is a theoretical discussion as is evidenced by the title of the article as well as the language of the discussion as used throughout Manheimer.

As previously stated, Manheimer is a theoretical discussion of a basic LAPPS system in general. Manheimer does not teach or suggest the current large area metallization pretreatment and surface activation system. Manheimer does not teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate.

Applicants respectfully submit that the title of Manheimer is explicit and definitive in this regard as the discussion is entitled "*Theoretical* overview of the large-area plasma processing system (LAPPS)" (emphasis added). The discussion outlines the scientific and mathematical explanations for a LAPPS system, but does not teach or suggest the current large area metallization pretreatment and surface activation system nor does Manheimer teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate. Applicants respectfully submit that mathematical formulas, laws of nature, and purely theoretical phenomena have long been considered unpatentable.

Furthermore, Applicants respectfully submit that the current large area metallization pretreatment and surface activation system *removes* the critical limitations set forth in and required by the Manheimer theoretical discussion. Manheimer specifically states that there in

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

fact exist size limitations for the plasma and electron beam. Additionally, Manheimer repeatedly, and throughout the theoretical discussion, states the *requirement* of a magnetic field. The current invention does *not* require a magnetic field, although in some embodiments a magnetic field may be utilized.

In Manheimer, there are multiple references throughout to the *requirement* of a magnetic field. Some of these references include, but are not limited to, the Abstract (line 5), the Introduction (line 15 of the first column and line 18 of the second column and multiple references in the final paragraph of the Abstract). The first sentence of the second section (2. Beam propagation and plasma production) reads, in part, "*discuss* the production and maintenance of a plasma by a *magnetized* electron beam". (emphasis added) More references include the first full paragraph of page 372 as published "a longitudinal magnetic field *B* is applied" and the next paragraph includes "the magnetic field can be tapered." As mentioned, these references are listed throughout and include a specific reference in the Summary section when the authors state there is a "need for a magnetic field".

The present application specifically mentions that a magnetic field is *not* required. For example, on page 13 or paragraph 0022 as filed, the application states that the electron beam can be produced "without the beam-collimating magnetic field". Additionally, Figure 4 illustrates a schematic without a magnetic field.

Claims 1, 8, and 19 have been amended to use the phrase "consisting essentially of". Again, Applicants would like to thank the Examiner for taking the time to discuss this amendment.

Claims 1, 8 and 19 do not contain the limitation of the magnetic field and as such the claimed invention is new, separate, and distinct over the prior art reference.

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

Therefore, Applicants respectfully submit that the 103(a) rejection has been successfully traversed and that claims 8-14, 16-18, 26-32, and 34-36 are in condition for allowance. Applicants respectfully request reconsideration as to, and removal of, the 103(a) rejection.

The Examiner has rejected Claims 15 and 33 under 35 U.S.C. 103(a) as being unpatentable over "Theoretical overview of the large-area plasma processing system (LAPPS)" by Manheimer et al. (Manheimer) in view of US 5,089,066 to Hamada et al. (Hamada) as applied to claims 14 and 32 above, and further in view of US 5,178,739 to Barnes et al. (Barnes).

The Examiner states that it would have been obvious to "modify the *invention of Manheimer*" in view of Hamada to utilize magnetrons. (emphasis added)

Again, Applicants respectfully submit that Manheimer does not teach an invention. Rather, Manheimer is a theoretical discussion as is evidenced by the title of the article as well as the language of the discussion as used throughout Manheimer.

As previously stated, Manheimer is a theoretical discussion of a basic LAPPS system in general. Manheimer does not teach or suggest the current large area metallization pretreatment and surface activation system. Manheimer does not teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate.

Applicants respectfully submit that the title of Manheimer is explicit and definitive in this regard as the discussion is entitled "*Theoretical overview of the large-area plasma processing system (LAPPS)*" (emphasis added). The discussion outlines the scientific and mathematical explanations for a LAPPS system, but does not teach or suggest the current large area metallization pretreatment and surface activation system nor does Manheimer teach or suggest the current method of producing a chemically active surface to improve the ability of a film to

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

adhere to a substrate. Applicants respectfully submit that mathematical formulas, laws of nature, and purely theoretical phenomena have long been considered unpatentable.

Furthermore, Applicants respectfully submit that the current large area metallization pretreatment and surface activation system removes the critical limitations set forth in and required by the Manheimer theoretical discussion. Manheimer specifically states that there in fact exist size limitations for the plasma and electron beam. Additionally, Manheimer repeatedly, and throughout the theoretical discussion, states the requirement of a magnetic field. The current invention does not require a magnetic field, although in some embodiments a magnetic field may be utilized.

In Manheimer, there are multiple references throughout to the *requirement* of a magnetic field. Some of these references include, but are not limited to, the Abstract (line 5), the Introduction (line 15 of the first column and line 18 of the second column and multiple references in the final paragraph of the Abstract). The first sentence of the second section (2. Beam propagation and plasma production) reads, in part, “*discuss* the production and maintenance of a plasma by a *magnetized* electron beam”. (emphasis added) More references include the first full paragraph of page 372 as published “a longitudinal magnetic field *B* is applied” and the next paragraph includes “the magnetic field can be tapered.” As mentioned, these references are listed throughout and include a specific reference in the Summary section when the authors state there is a “need for a magnetic field”.

The present application specifically mentions that a magnetic field is *not* required. For example, on page 13 or paragraph 0022 as filed, the application states that the electron beam can be produced “without the beam-collimating magnetic field”. Additionally, Figure 4 illustrates a schematic *without* a magnetic field.

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

Furthermore, Applicants respectfully submit that since claim 15 depends from the allowable claim 14, that claim 15 is therefore in condition for allowance and the rejection under 35 U.S.C. 103 is obviated. Similarly, claim 33 depends from claim 32 and since claim 32 depends from claim 19 and since claim 19 is in condition for allowance, Applicants respectfully submit that claim 33 is also in condition for allowance and the rejection under 35 U.S.C. 103 is obviated.

The Examiner has rejected Claims 8-14, 16-18, 26-32, and 34-36 under 35 U.S.C. 103(a) as being unpatentable over "Theoretical overview of the large-area plasma processing system (LAPPS)" by Manheimer et al. (Manheimer) in view of US 4,509,451 to Collins et al. (Collins).

The Examiner states that Manheimer recognizes that LAPPS has the disadvantage of requiring a magnetic field to confine the beam. The Examiner continues by stating that Manheimer recognizes the need for beams without this disadvantage. The Examiner then notes that Collins teaches an electron beam for producing a sheet plasma for treating the substrate. The Examiner then concludes that it would have been obvious to have modified Manheimer by utilizing an electron beam to produce a sheet plasma without a magnetic field as taught by Collins.

However, Applicants respectfully submit that if this were the case, then Manheimer would have included the teachings of Collins as Manheimer was one skilled in the art and at the time of Manheimer (2000) the teachings of Collins were public as the patent had been issued for more than 15 years (1985). Therefore Applicants respectfully submit that it is evident that the teachings of Collins cannot be combined with the Manheimer reference to result in the presently

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

claimed invention. If Manheimer could have used Collins to avoid the problems Manheimer would have used Collins and not stated explicitly that the need still existed (15 years after Collins) for a method to produce a sheet plasma without a magnetic field. The presently claimed invention solves these problems.

Furthermore, Applicants respectfully that the references should not be combined as the Examiner has and even if you do combine the references as the Examiner has, the result would not be as presently claimed in this application. The Examiner has explicitly stated this in paragraph 2 of his Office Action and now appears to be again contradicting himself. The Examiner states that where no magnetic field is utilized there cannot be a separation between the plasma sheet and the substrate.

Applicants respectfully request further explanation as the Examiner appears to be contradicting himself by stating that the present claims cannot be accomplished but then stating that by combining these two references it can be accomplished and therefore it is obvious.

Again, Applicants respectfully submit that if the references are properly combinable that Manheimer, skilled in the art, would have taught using Collins, a 15 year old reference, and not stating that this long-standing problem still exists. In fact, the problem continued to exist and was long-standing, until the current inventors solved this problem as defined in the current application.

The Examiner states that Manheimer indicates that a pretreatment is to be used before conventional plasma processing but does not disclose depositing a layer onto the pretreated substrate. The Examiner also states that Hamada discloses various deposition techniques that

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

can be used after a substrate is pretreated. The Examiner concludes that it would have been obvious to "modify the *invention* of Manheimer" to utilize sputtering of CVD. (emphasis added)

As previously submitted, Applicants respectfully submit that Manheimer does not teach an invention. Rather, Manheimer is a theoretical discussion as is evidenced by the title of the article as well as the language of the discussion as used throughout Manheimer.

As previously stated, Manheimer is a theoretical discussion of a basic LAPPS system in general. Manheimer does not teach or suggest the current large area metallization pretreatment and surface activation system. Manheimer does not teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate.

Applicants respectfully submit that the title of Manheimer is explicit and definitive in this regard as the discussion is entitled "*Theoretical* overview of the large-area plasma processing system (LAPPS)" (emphasis added). The discussion outlines the scientific and mathematical explanations for a LAPPS system, but does not teach or suggest the current large area metallization pretreatment and surface activation system nor does Manheimer teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate. Applicants respectfully submit that mathematical formulas, laws of nature, and purely theoretical phenomena have long been considered unpatentable.

Furthermore, Applicants respectfully submit that the current large area metallization pretreatment and surface activation system *removes* the critical limitations set forth in and required by the Manheimer theoretical discussion. Manheimer specifically states that there in fact exist size limitations for the plasma and electron beam. Additionally, Manheimer repeatedly, and throughout the theoretical discussion, states the *requirement* of a magnetic field. The current

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

invention does *not* require a magnetic field, although in some embodiments a magnetic field may be utilized.

In Manheimer, there are multiple references throughout to the *requirement* of a magnetic field. Some of these references include, but are not limited to, the Abstract (line 5), the Introduction (line 15 of the first column and line 18 of the second column and multiple references in the final paragraph of the Abstract). The first sentence of the second section (2. Beam propagation and plasma production) reads, in part, "*discuss* the production and maintenance of a plasma by a *magnetized* electron beam". (emphasis added) More references include the first full paragraph of page 372 as published "a longitudinal magnetic field *B* is applied" and the next paragraph includes "the magnetic field can be tapered." As mentioned, these references are listed throughout and include a specific reference in the Summary section when the authors state there is a "need for a magnetic field".

The present application specifically mentions that a magnetic field is *not* required. For example, on page 13 or paragraph 0022 as filed, the application states that the electron beam can be produced "without the beam-collimating magnetic field". Additionally, Figure 4 illustrates a schematic without a magnetic field.

Claims 1, 8, and 19 have been amended to use the phrase "consisting essentially of". Again, Applicants would like to thank the Examiner for taking the time to discuss this amendment.

Claims 1, 8 and 19 do not contain the limitation of the magnetic field and as such the claimed invention is new, separate, and distinct over the prior art reference.

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

Therefore, Applicants respectfully submit that the 103(a) rejection has been successfully traversed and that all the claims are in condition for allowance. Applicants respectfully request reconsideration as to, and removal of, the 103(a) rejection.

The Examiner has rejected Claims 15 and 33 under 35 U.S.C. 103(a) as being unpatentable over “Theoretical overview of the large-area plasma processing system (LAPPS)” by Manheimer et al. (Manheimer) in view of Collins and US 5,089,066 to Hamada et al. (Hamada) as applied to claims 14 and 32 above, and further in view of US 5,178,739 to Barnes et al. (Barnes).

The Examiner states that it would have been obvious to “modify the *invention of Manheimer*” in view of Hamada to utilize magnetrons. (emphasis added)

Again, Applicants respectfully submit that Manheimer does not teach an invention. Rather, Manheimer is a theoretical discussion as is evidenced by the title of the article as well as the language of the discussion as used throughout Manheimer.

As previously stated, Manheimer is a theoretical discussion of a basic LAPPS system in general. Manheimer does not teach or suggest the current large area metallization pretreatment and surface activation system. Manheimer does not teach or suggest the current method of producing a chemically active surface to improve the ability of a film to adhere to a substrate.

Applicants respectfully submit that the title of Manheimer is explicit and definitive in this regard as the discussion is entitled “*Theoretical overview of the large-area plasma processing system (LAPPS)*” (emphasis added). The discussion outlines the scientific and mathematical explanations for a LAPPS system, but does not teach or suggest the current large area metallization pretreatment and surface activation system nor does Manheimer teach or suggest the current method of producing a chemically active surface to improve the ability of a film to

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

adhere to a substrate. Applicants respectfully submit that mathematical formulas, laws of nature, and purely theoretical phenomena have long been considered unpatentable.

Furthermore, Applicants respectfully submit that the current large area metallization pretreatment and surface activation system removes the critical limitations set forth in and required by the Manheimer theoretical discussion. Manheimer specifically states that there in fact exist size limitations for the plasma and electron beam. Additionally, Manheimer repeatedly, and throughout the theoretical discussion, states the requirement of a magnetic field. The current invention does not require a magnetic field, although in some embodiments a magnetic field may be utilized.

In Manheimer, there are multiple references throughout to the *requirement* of a magnetic field. Some of these references include, but are not limited to, the Abstract (line 5), the Introduction (line 15 of the first column and line 18 of the second column and multiple references in the final paragraph of the Abstract). The first sentence of the second section (2. Beam propagation and plasma production) reads, in part, "*discuss* the production and maintenance of a plasma by a *magnetized* electron beam". (emphasis added) More references include the first full paragraph of page 372 as published "a longitudinal magnetic field *B* is applied" and the next paragraph includes "the magnetic field can be tapered." As mentioned, these references are listed throughout and include a specific reference in the Summary section when the authors state there is a "need for a magnetic field".

The present application specifically mentions that a magnetic field is *not* required. For example, on page 13 or paragraph 0022 as filed, the application states that the electron beam can be produced "without the beam-collimating magnetic field". Additionally, Figure 4 illustrates a schematic *without* a magnetic field.

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

Furthermore, Applicants respectfully submit that since claim 15 depends from the allowable claim 14, that claim 15 is therefore in condition for allowance and the rejection under 35 U.S.C. 103 is obviated. Similarly, claim 33 depends from claim 32 and since claim 32 depends from claim 19 and since claim 19 is in condition for allowance, Applicants respectfully submit that claim 33 is also in condition for allowance and the rejection under 35 U.S.C. 103 is obviated.

Application Serial No.: 10/825,800
Applicant(s): Leonhardt et al.

Docket No.: N.C. 95,876

RECEIVED
CENTRAL FAX CENTER
OCT 23 2006

Conclusion

In conclusion, Applicants thank the Examiner for his comments and suggestions for amending the claims as Applicants have. Applicants respectfully submit that the Examiner's Office Action has been fully responded to and that the claims are in condition for allowance. In the furtherance of compact prosecution, if a personal or telephone interview would help expedite matters, the Examiner is requested to contact Steve Hunnius at 202-404-1554.

Kindly charge any additional fees due, or credit overpayment of fees, to Deposit Account No. 50-0281.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,



Stephen T. Hunnius
Reg. No. 48,304
Naval Research Laboratory
Code 1008.2
4555 Overlook Avenue, S.W.
Washington, D.C. 20375-5325
(202) 404-1554